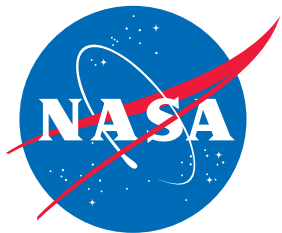
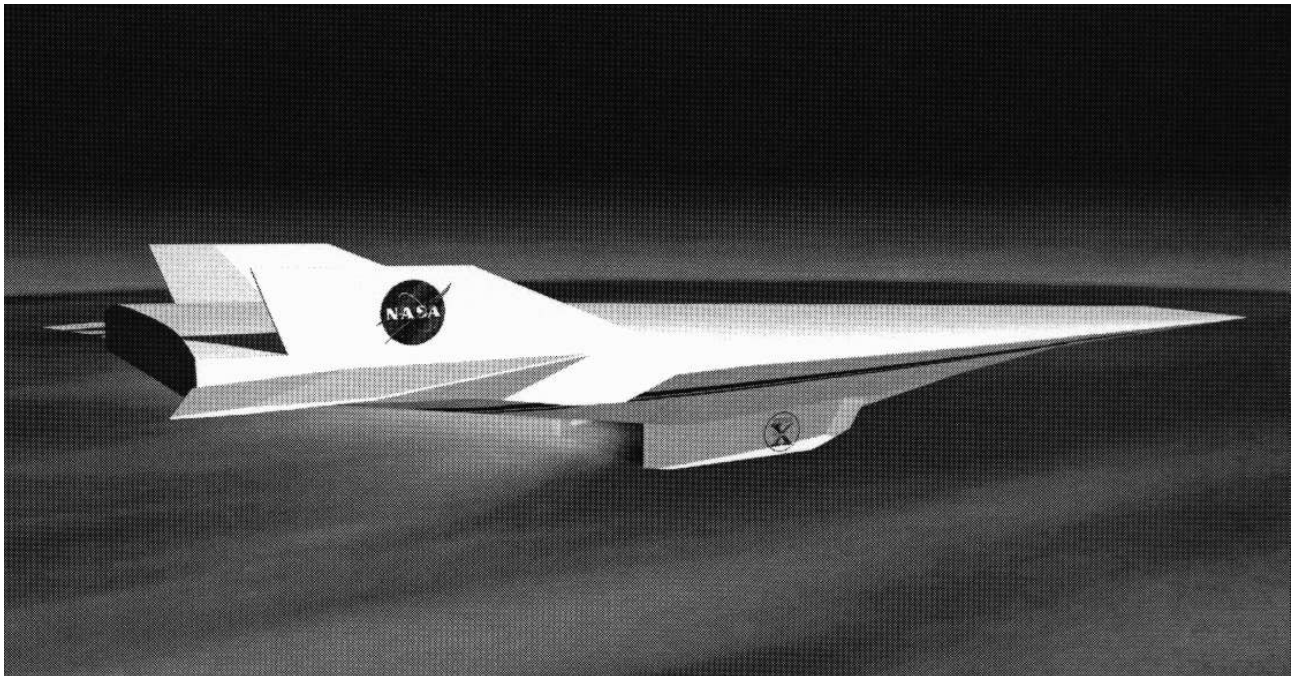

Hyper-X Scramjet Glider Kit



National Aeronautics and
Space Administration



Hyper-X "Scramjet" Experiment

Hyper-X will be the fastest "air-breathing" experimental "X-plane" ever. It will fly up to 10 times the speed of sound, which is Mach 10 or 7,000 mph!

The goal of the Hyper-X is to demonstrate "scramjet" engine technology in flight. A scramjet is an air-breathing engine that uses oxygen from the air that it captures. Because the vehicle doesn't need to carry oxygen in heavy tanks, it can be a lighter and smaller vehicle or it can carry a heavier payload than a rocket. Scramjets mix and burn oxygen and fuel, such as hydrogen, at speeds faster than the speed of sound (Mach 1).

The design of the Hyper-X is that of a flying engine. The lower body (fuselage) compresses air entering the scramjet engine and expands the exhaust to create thrust. The "lifting body" shape also gives the Hyper-X lift so that it doesn't need wings. The sharp shape of the nose, scramjet engine, and tail reduces drag so that the Hyper-X can cut through the atmosphere at such high speeds.

Flying at "hypersonic" speeds—faster than Mach 5—can get really hot! Thermal Protection Systems (TPS) will keep the Hyper-X from burning up in the atmosphere. Some TPS materials will act like Space Shuttle tiles by insulating the vehicle from the intense heat of hypersonic flight. Other TPS will use water with anti-freeze, hydrogen or other fuel to take away the heat from the hottest surfaces before being burned in the engine or released overboard.

The history of X-planes is a great one! The rocket powered X-1 flown in 1947 by Chuck Yeager was the first aircraft to fly faster than the speed of sound—breaking the sound barrier with a sonic boom. Several other X-planes have explored high-speed flight. The record of Mach 6.7 was set by Pete Knight in the rocket powered X-15 in 1967.

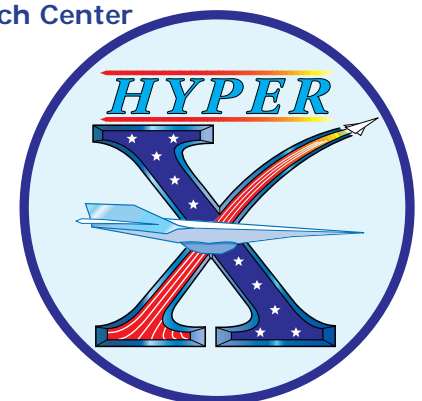
At the turn of the century, the uncrewed Hyper-X (X-43) will be launched at 19,000 feet by the NASA B-52 and boosted by a Pegasus rocket to 95,000 feet. It will then separate from the booster and the engine will then begin its seven second hypersonic run. After the fuel burns out, the Hyper-X will conduct flight maneuvers to record how a lifting body flies at hypersonic speeds. The Hyper-X hopes to set new speed records for an air-breathing X-plane by flying up to Mach 10!

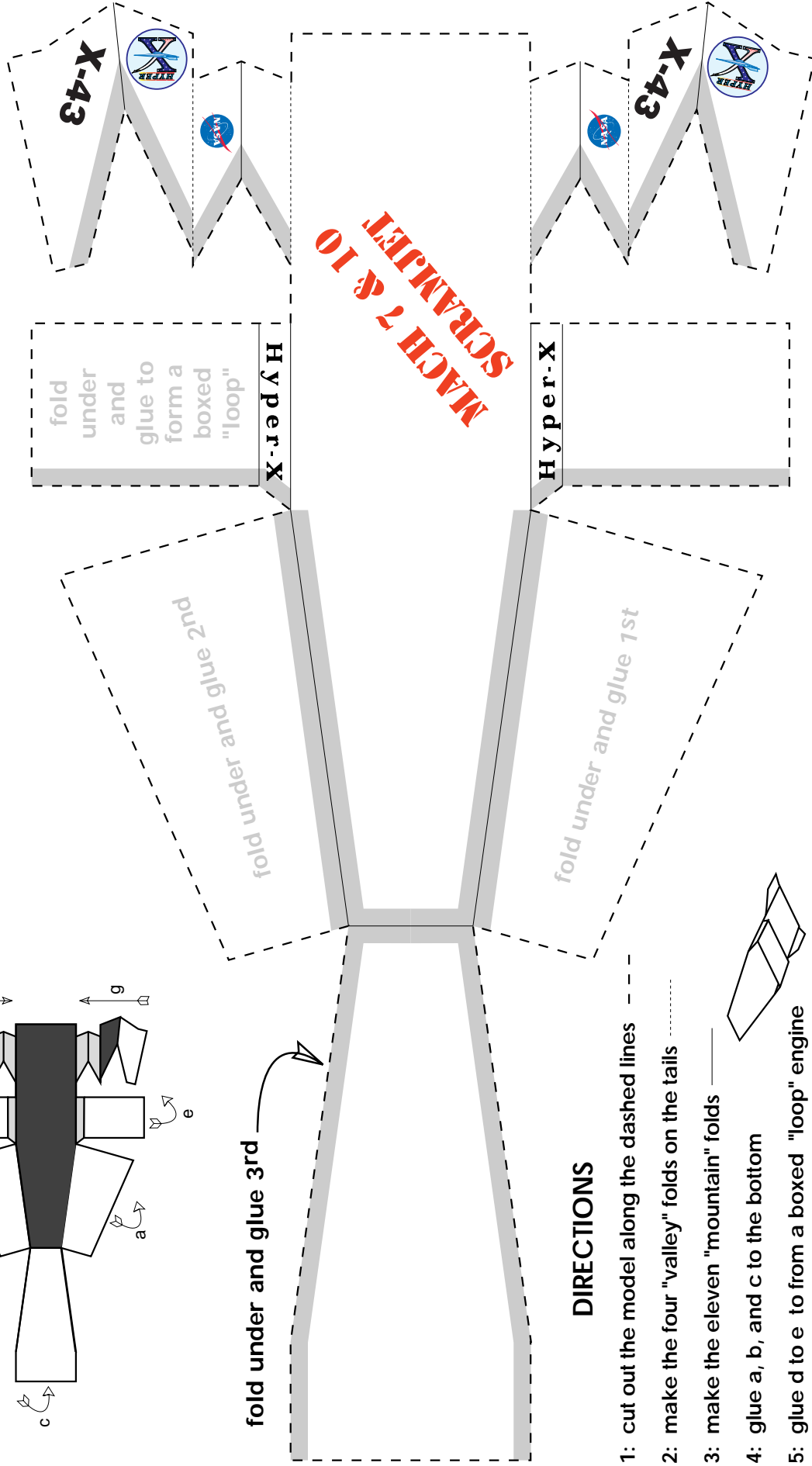
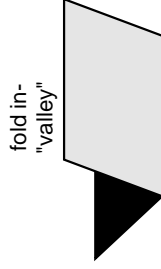
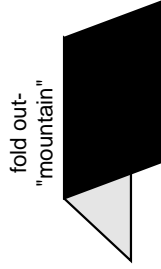
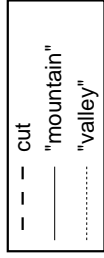
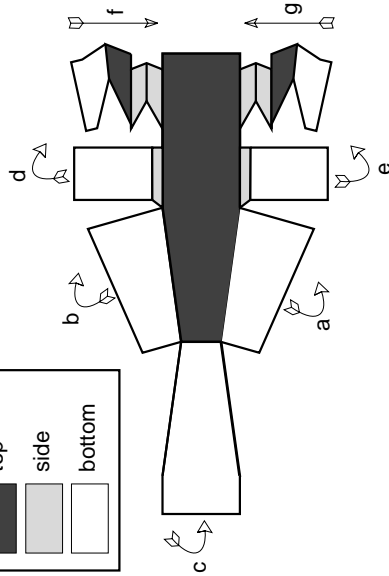
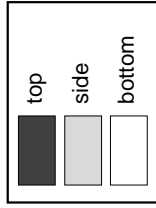
The knowledge gained from these flights will help accelerate U.S. aerospace technology into the next century. In the future, scramjets could be used to launch satellites, visit space stations, or travel from New York to Tokyo in under three hours!

For more information, contact:

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DIRECTIONS

- 1: cut out the model along the dashed lines
- 2: make the four "valley" folds on the tails
- 3: make the eleven "mountain" folds
- 4: glue a, b, and c to the bottom
- 5: glue d to e to form a boxed "loop" engine
- 6: glue f and g in an "accordion" fashion and to the bottom
- 7: Happy Flying!



Print or copy on 67# paper for best results!